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ERIOPHYID STUDIES II

H. H. KEIFER, State Department of Agriculture, Sacramento, California

The first installment of this series appeared in the Bulletin of the California State Department of Agriculture, Volume 27, No. 2, p. 181, June 22, 1938. In that article seventeen Eriophyids were listed, of which nine were described as new. The present article contains descriptions of eighteen additional mites, fourteen of which are considered new.

On the anterior internal side of the female genitalia there is what appears to be a large muscle attachment. For want of conclusive evidence as to the nature of this structure, I am terming it the *Anterior Apodeme* of the female genitalia (AP on the plates). In the first installment this structure was illustrated in most cases but at that time its taxonomic possibilities were not realized. The apodeme is admittedly a little variable but studies up to the present indicate that it retains certain characteristics according to the species. It will be noted that no two species in the present article have the apodeme of the same shape. In the case of the *Epitrimerus* species the specific differences of this structure are great. Whether or not the anterior apodeme will aid in separating closely allied species remains to be discovered, but present studies indicate that it is worthy of note in taxonomic studies.

I take pleasure in dedicating the first species in the following descriptions to D. B. Mackie, Supervisor of Entomology of the State Department of Agriculture, who is much interested in the progress of Eriophyid systematics.

Genus **Eriophyes** von Siebold 1850.
von Siebold, Jahresber. Schles. Ges. vol. 28, p. 89, 1850.
Nalepa, Das Tierreich, vol. 4, p. 5, 1898.

The author of this genus proposed it partly on the basis of the work of former investigators who were just beginning to realize the true nature of leaf *Erinea*. Grape leaf erineum was among those known and commented upon, though the causative mite, *Eriophyes vitis* (Pgst.) was not described until 1857 (Verh. Ver. Heidelb. vol. 1, p. 48.) The writer knows of no genotype designation for the genus *Eriophyes*, and in view of the general availability of *Eriophyes vitis* for study it can be considered as the genotype unless there has been a prior fixation.

The basis for the above has been largely taken from Nalepa's Historical Review of the Eriophyids in Volume 24, of the Zoologica, page 169, 1911. Further generic names which are considered as synonyms of *Eriophyes* are: 1. *Phytoptus* Dujardin, 1851, type apparently what is now known as *Eriophyes avellanae* Nal. As pointed out in the first installment of this series the species *pini* Nal., *avellanae* Nal., and *quadrisetus* Nal., have a character by which they can easily be separated from the rest of the *Eriophyes* species, namely, the subdorsal anterior setae. Thus it may be advantageous to resurrect *Phytoptus* in a restricted sense. 1. *Typhlodromus* Scheuten 1857 and *Typhlodromus pyri* Scheuten refer to eight-legged mites on pear leaves whose four-

legged larvae live in the leaf blisters. As far as this refers to the Eriophyidae, the mite in question is *Eriophyes piri* (Pgst.) 1857. Nalepa is doubtless correct in giving these names no recognition. 3. *Cecidophyes* Nalepa 1889, and *Cecidophyes galii* Nal. belong in *Eriophyes* and merit no discussion here.

Eriophyes mackiei Keifer, new species
Plate XXI

Female up to 230 microns long, when extended, 45 microns wide, whitish, elongate and wormlike. Rostrum short, projecting anteriorly and bent ventrad, 17.5 microns long. Shield 30 microns long, 26 microns wide, weakly sinuate in side view; disc with two longitudinal lines, side with two diagonal lines; dorsal tubercles 18 microns apart, moderate size, on rear margin; dorsal seta 9 microns long, directed caudad. Legs moderately stout. Foreleg 25 microns long, patella 4.5 microns long, patellar seta 20 microns long, tibia 5 microns long, tarsus 6.75 microns long, claw 7.5 microns long, claw not knobbed, tapering, featherclaw 3-rayed. Hindleg 22.5 microns long, patella 4.25 microns long, patellar seta 7 microns long, tibia 4.25 microns long, tarsus 6.5 microns long, claw 7.75 microns long. Anterior coxae contiguous, the sternal line unforked; coxal setae I near anterior coxal margin, coxal setae II the same distance apart as setae I and well before end of sternal line; coxal setae III well behind seta II, about 24 microns long. Abdomen with 50-55 rings, the rings a little more numerous dorsally; the rings microtuberculate, the microtubercles extended into a short point or spine and not touching the rear edge of the rings. Lateral seta 20 microns long, on ring 5, directly above genital seta; first ventral seta about 17 microns long, on about ring 16; second ventral 11 microns long, on ring 29; third ventral 20 microns long, 4 rings from anal lobes; caudal setae 32 microns long; accessory setae prominent, 6.5 microns long. Female genitalia 20 microns wide, 13 microns long, coverflap with about 8 ridges, the seta 5.5 microns long.

Male 160-170 microns long, 31 microns wide. Male genitalia 16 microns wide, 11 microns long, the seta 4.5-5 microns long.

Type slide so designated, of mites collected in Capitol Park, Sacramento, from erineum pockets on the underside of oak leaves (*Quercus agrifolia* Neé), June 10, 1938, by the writer. Three paratype slides, so designated, bear the same data. Mites that appear identical have been taken from *Quercus chrysolepis* Liebm. at Placerville, May 30, and at Camp Rodgers, Plumas County, June 12. In the Placerville case the erineum was in pockets only, but at Camp Rodgers leaves were collected with an entire undercovering of erineum. The Interior Liveoak, *Quercus wislizenii*, A. DC. also has these erineum pockets but while they have not been adequately investigated it seems reasonable to assume that *E. mackiei* is the cause. The principal erineum producer on European oaks is *Eriophyes ilicis* (Can.) and its numerous subspecies. This mite is distinguished from *mackiei* by having 80 abdominal rings and a 2-rayed featherclaw. The other European oak erineum former is *E. breviceps* (Can.). This species lacks carinae on the shield and has a 4-rayed featherclaw.

Eriophyes neoartemisiae Keifer, new species
Plate XXII

Female 200 microns long, 40 microns wide, wormlike, light yellow. Rostrum short, obliquely downcurved. Shield 24 microns long, 36 microns wide, gently curved above, subtriangular; the disc of about seven longitudinal lines, the central line not reaching the anterior point of the shield, the lateral lines curved and broken and ending well before the rear shield margin; shield side of diagonal lines interspersed with short dashes; dorsal tubercles on rear edge of shield, 18 microns apart, the setae directed backward and 40 microns long. Legs moderately stout. Foreleg 40 microns long, patella 4.5 microns long, patellar seta 20 microns long, tibia 6.5 microns long, tarsus 7.5 microns long, claw tapering, slightly knobbed 8.5 microns long, feather claw 4-rayed. Anterior coxae contiguous; setae I opposite anterior end of sternal line and slightly wider than setae II; setae II opposite rear fork of sternal line; setae III 36 microns long. Abdomen of 70-75 rings; these rings microtuberculate except on the dorsum of the rear one-fourth where they more or less lack tubercles and there is a slight doubling of the sternites. Lateral seta above and slightly caudad to genital seta, 20 microns long, on ring 9-10; first ventral 46 microns long, on ring 23-24; second ventral 18 microns long, on ring 39-40; third ventral 32 microns long, 7 rings from rear. Caudal seta 80 microns long; accessory seta 6.5 microns long. Female genitalia 18 microns wide, 10 microns long, coverflap with about eight longitudinal ridges; genital setae on unusually large lobes, 14 microns long.

Male, 170 microns long, 40 microns wide. Male genitalia 14 microns wide, 11 microns long, the seta 8 microns long.

Type slide, so designated, of mites collected from the leaves and buds of *Artemisia heterophylla* Nutt. in Sacramento, June 20, 1938, by the writer. Three paratype slides, so designated, with same data. The mites were collected wandering on the undersides of the leaves or in the buds. On the above date no erineum pockets had developed on the leaves. On July 12, leaves of this plant were examined which had numerous erineum pockets developing on the undersides. Few mites were taken wandering over the leaf surface, some were taken in the buds, but numerous eggs and immature individuals, with mature mites were noted in the erinea. The resulting slide showed some mites as described above. There were also larger female mites possessing microtuberculate tergites over the entire dorsum. Their genitalia apparently lacked the large setal lobes, but had the anterior apodeme as figured for *neoartemisiae*. This may indicate dimorphism to accommodate first a vagrant existence, later a protected state. The mite is very similar to *Eriophyes artemisiae* (Can.). of Europe, especially in shield pattern, and may eventually be considered a variety. The injury that the European mite does to *Artemisia vulgaris* L. (of which *heterophylla* Nutt. is usually considered a variety) does not seem to be the same as the hairy masses produced on the leaves of this California plant.

Eriophyes fici Essig

Plate XXIII

Essig, E. O., Mo. Bul. Cal. Dept. Agr. Vol. XI, p. 62, 1922, (as *Eriophyes* sp.)
Essig, Mo. Bul. Cal. Dept. Agr. Vol. XI, p. 466, 1922. (As *E. fici* Ewing manuscript)
Essig, Ins. Wn. N. Am. p. 47, 1926 (credited to Ewing).
Nalepa, A., Marcellia, vol. 25, p. 91, 1929 (credited to Ewing).

Female 160-170 microns long, 37 microns wide, wormlike, tapering, color yellow. Rostrum moderate size, downcurved. Shield 26 microns long, 33 microns wide, little curved, the tubercles on the rear edge 22 microns apart; shield design with disc of longitudinal lines, the central line incomplete and anchor-shaped to the rear, shield side with one or two diagonal lines and granular; dorsal setae 25 microns long, projecting to the rear. Legs moderately stout. Foreleg 26 microns long, patella 5 microns long, patellar seta 20 microns long, tibia 6 microns long, tarsus 5.5 microns long, claw a little knobbed, 6.5 microns long, featherclaw 5-rayed. Hindleg 25 microns long, patella 4.5 microns long, patellar seta 9 microns long, tibia 5 microns long, tarsus 5.5 microns long, claw 7 microns long. Abdomen with 57-62 rings, microtuberculate, miscrostriate caudally. Lateral seta on ring 7, above genital seta, 13 microns long. First ventral seta 33 microns long, on ring 17. Second ventral 11 microns long, on ring 31. Third ventral 5 rings from rear, 19 microns long. Caudal seta about 44 microns long; accessory seta present. Female genitalia 17.5 microns wide, 14 microns long, coverflap with 8 ridges, seta 6.5 microns long.

Male 135-145 microns long, 64 microns wide. Male genitalia 16 microns wide, 12 microns long, seta 4 microns long.

The specimens from which the description and figures were drawn are from Fresno capri figs, June 13, 1938. The mites were in the scales at the blossom opening. There is a curious mixup in the name of this mite. Essig consistently credited the mite to Ewing who has apparently published nothing on it. In addition the name is preoccupied by *Eriophyes ficus* Cotte, Bul. Soc. Path. Veget. Vol. 7, p. 26, 1920, and if not a structural synonym of the latter species will have to be renamed. Whatever the name of this mite may be it is structurally close to the citrus bud mite *Eriophyes sheldoni* Ewing.

California pears are consistently and often severely attacked by *Eriophyes piri* (Pgst.), Pear Leaf Blister Mite. These mites are either to be found in the buds or in leaf blisters. In Europe a very similar mite which rolls the edges of pear leaves is on the basis of structure known as *E. piri* subsp. *marginemtorquens* Nal. The fact that in spite of an enormous population of blister mites we never find leaf

edgerolling in California seems to indicate clearly the two types of mites are in reality specifically distinct. It clearly indicates a very great fixity of habit in the make-up of these mites.

Eriophyes spinulifera Keifer, described in the first installment of this series was taken in San Francisco, May 23, 1938, from Cecidomyid terminal galls on *Ericameria ericoides* (Less.). A reconsideration of the original host given for this mite seems to indicate it is in error, and instead of *Artemisia californica* Less., the host should have been *Ericameria pinifolia* (Gray) Hall.

Platyphytoptus subinianae Keifer, described in the first installment was observed for the first time on new needles of its host. The mites were longer and whiter than those observed last winter and were congregated just above the needle sheath on the inner surfaces. Males were also observed. The locality in this case was Aukum, El Dorado County, July 7, 1938. *Eriophyes pini* Nal. was also found on these needles.

Genus **Paraphytoptus** Nalepa 1896

Nalepa, Anz. Akad. Wien. Vol. 33, p. 55, 1896.

The genotype is *paradoxus* Nalepa, for which the genus was originally designated. Nalepa has placed this anomalous genus in the Phyllocoptinae on the basis of the rear two thirds of the abdomen. After studying the new species described below the writer is of the opinion that *Paraphytoptus* is more nearly related to the genus *Eriophyes* than to *Phyllocoptes*. First the rostrum, shield, legs, anterior third of the abdomen, and the underside of the abdomen are typical for *Eriophyes* and quite atypical for *Phyllocoptes* or relatives. Second, species unquestionably referable to *Eriophyes*, such as *neoartemisiae* n. sp., *E. cactorum* Keifer, and others, show a definite tendency to produce these smoother, broader tergites to the rear, with consequent doubling of the sternites. Thus *Paraphytoptus* looks like a direct development from *Eriophyes* and to be unaffiliated with *Phyllocoptes*. The habitat in which the species described below was found further aids us in this reasoning. *Phyllocoptes*-like forms with the large heavy plates on the dorsum are most usually free-living and thus this structure seems in response to the need for protection not needed by bud mites or gall-makers. The *Artemisia* leaves on which the below mentioned species was found are heavily pilose underneath and mites feeding on the leaf tissue wriggle into this hair leaving only their rear sections exposed. Hence the need for heavy back-plates toward the rear.

Paraphytoptus inaequalis Keifer, new species

Plate XXIV

Female 210 microns long, 49 microns wide, rather long, wormlike, curved, yellow to amber in color. Rostrum moderate in size, downcurved. Shield 26 microns long, 38 microns wide, nearly straight above, not overhanging rostrum; shield design with longitudinal lines in the disc, side with diagonal lines and granulations; dorsal tubercles on rear edge, 23 microns apart; dorsal setae directed caudad, 40 microns long. Legs moderately strong. Foreleg 26 microns long, patella 4.5 microns long, patellar seta 25 microns long, tibia 7 microns long, tarsus 6.5 microns long, claw 9 microns long with a small knob; featherclaw 5-rayed. Hindleg 25 microns long, patella 4.5 microns long, patellar seta 12 microns long, tibia 5.5 microns long, tarsus 7 microns long; claw 9 microns long. Coxae contiguous, the sternal line slightly forked; coxal setae I opposite anterior end of sternal line, the same width apart as setae II; setae II opposite rear of sternal line; setae III 36 microns long. Abdomen with 23 rings equal or nearly equal around the body, these rings evenly microtuberculate; from thence caudad there are 21 tergites, slightly microtuberculate; 42 sternites, microtuberculate. Lateral seta on ring 9, 12 microns long. First ventral on 23-24, 46 microns long; second ventral 16 microns long, on sternite 40; third ventral 22.5 microns long, on sixth ring from rear. Caudal seta about 62 microns

long; accessory setae present. Female genitalia 22 microns wide, 15 microns long, coverflap with about twelve ridges, seta 11 microns long.
No males found.

Type slide so designated, of mites collected as vagrants on the under side of *Artemisia heterophylla* Nutt. leaves, Sacramento, June 20, 1938, by the writer. Three paratype slides have same data, or were collected June 19. The mite is very similar to *P. paradoxus* Nal. of Europe, but is longer and the rear tergites are somewhat microtuberculate. In addition it is so far as known entirely a leaf vagrant.

Genus **Diptilomiopus** Nalepa 1916

Nalepa, Anz. Ak. Wien, Vol. 53, p. 283, 1916, genotype *javanicus* Nal. 1916.
Rostrum large, the chelicerae sickle-shaped, the rostrum horizontal above basally then abruptly downcurved and extended into a long point. Shield narrow, declivitous, not overhanging rostrum; dorsal setae missing. Legs with five joints (genotype with patella missing) or six (the new species), the femoral setae missing in the new species as well as the patellar seta of hindleg; featherclaw divided. Coxal setae I missing in the new species, the sternum a prominent ridge. Abdomen entirely punctate, with a more or less prominent furrow on each side of dorsum back of the shield; tergites somewhat more numerous than sternites; lateral seta missing.

Diptilomiopus arctostaphyli Keifer, new species
Plate XXV

Female 210 microns long, 70 microns wide, stocky, robust spindleform, yellow. Rostrum projecting well down between front legs, 68 microns long, chelicerae black. Shield narrow, declivitous, 25 microns long, 66 microns broad, design of lines forming an irregular network. Legs rather strong. Foreleg 48 microns long, patella 7 microns long, patellar seta 46 microns long, tibia 6.5-7 microns long, tarsus 14 microns long; claw 11.5 microns long, tapering, knobbed, bent down between forks of featherclaw; featherclaw deeply bifurcate, 7-rayed on each side. Hindleg 42 microns long, patella 6.5 microns long, tibia 6.5-7 microns long, tarsus 13.5 microns long, claw 10 microns long. Coxal setae II well ahead of the rear end of the sternal ridge; setae III 37 microns long. Abdominal tergites 60-65; sternites 70-75. First ventral seta on ring 26, 45 microns long; second ventral 34 microns long, on ring 44; third ventral 10 rings from rear, 34 microns long. Caudal seta about 45 microns long, accessory setae minute, short. Female genitalia 34 microns wide, 20 microns long, the coverflap smooth, seta 9 microns long.
Male 160-170 microns long, 65 microns wide. Male genitalia 24.5 microns wide, 17 microns long, seta 10 microns long.

Type slide, so designated, with mites taken as vagrants on the undersides of second year leaves of *Arctostaphylos* sp. on the southwest ridge of Mt. Tamalpais (by toll station) July 4, 1938, by the writer. Paratype slides, so designated, with same data, four in number. The new species has so many points in common with *D. javanicus* Nal. that there is no question as to the congeneric relationship, in spite of the presence in *arctostaphyli* of the patella. The genotype lives as inquiline in leaf-galls of *Eriophyes hemigraphidis* Nal. on the Acanthaceous plant *Hemigraphis confinis* Cogn. The new species lives in the open on second year leaves of manzanita (Ericaceae). The fact that the current year leaves are practically uninhabited is likely explained by their stickiness. The mite is a robust, clumsy, yellow species with the black sickle-shaped chelicerae quite noticeable under a low power binocular. Of particular note are: the shape of the beak of this mite, its featherclaws, its close relationship to a species in Java, and the occurrence of this type of beak and shield on the following species.

"Phyllocoptes" megarostris Keifer, new species
Plate XXVI

Female up to 166 microns long, 40 microns wide, elongate and wormlike, light yellow. Rostrum very prominent, projecting down between forelegs, chelicerae long and sickel-shaped. Shield short, declivitous, not overlying rostrum base, 34 microns wide, 19 microns long: design of longitudinal lines in disc, netlike laterally; dorsal tubercles 20 microns apart, a little ahead of rear margin, the setae strong, projecting forward, 23.5 microns long. Legs moderately strong. Foreleg 30.5 microns long, patella 5.5 microns long, patellar seta 21 microns long, tibia 6 microns long, tarsus 8.5 microns long, claw tapering, 8.5 microns long, featherclaw 7-rayed. Hindleg 28.5 microns long, patella 5 microns long, patellar set 10 microns long, tibia 5.5

microns long, tarsus 8 microns long, claw 8.5 microns long. Anterior coxae contiguous at one point; coxal setae I the same width apart as II; coxal setae III 33 microns long. Abdomen with rings entirely microtuberculate, the sternites more prominently so than the tergites; tergites 40-45 in number, sternites 75-80. Lateral seta above genital seta, 15 microns long, on ring 14; first ventral 40 microns long, on ring 29; second ventral 29 microns long, on ring 44, third ventral 7 rings from rear, 25 microns long. Caudal seta 45-50 microns long; accessory seta present. Female genitalia 22.5 microns wide; 17 microns long, coverflap smooth, seta 18 microns long.

Male 150 microns long, 45 microns wide; genitalia 17.5 microns wide, 11 microns long, the seta 19 microns long.

Type slide, so designated, of mites taken wandering on the undersides of *Quercus lobata* Neé (Valley White Oak) leaves, the leaves collected May 31, 1938, at Ojai, Ventura County, California, by Romain Young, Two paratype slides bear same data. These mites are mixed on the slides with the sixteenth species described in this article. The striking rostrum and shield which are very similar to *Diptilomiopus* undoubtedly indicate relationship. However, the structural differences are sufficient to make this species generically different from those two species. On the other hand *megarostris* fits in fairly well with *Phyllocoptes* on abdominal characters. But the rostrum and shield rather effectively separate this from *Phyllocoptes* and a new genus will be proposed in this case after some further study.

Phyllocoptes calirubi Keifer, new species

Plate XXVII

Female 140-155 microns long, 47-50 microns wide, 35 microns thick; elongate, flattened-spindleform, amber color. Rostrum projecting downwards. Shield overhanging rostrum base, subsriangular with anterior point produced; surface sparsely granular, the disc with longitudinal lines and the sides with a roughened edge and a band of granules; dorsal tubercles a little ahead of rear margin 20 microns apart; dorsal setae projecting upwards, 11 microns long. Legs moderately long. Forelegs 28 microns long, patella 4.5 microns long, patellar seta 23 microns long, tibia 6.5–7.0 microns long, tarsus 6–6.5 microns long, claw 7 microns long, not knobbed, featherclaw 5-rayed. Hindleg 27 microns long, patella 4.5 microns long, patellar seta 5 microns long, tibia 4.5 microns long, tarsus 6.5 microns long, claw 8 microns long. Anterior coxae contiguous; setae I as far apart as setae II and situated a little ahead of anterior end of sternal line; setae II just above rear end of sternal line; coxal setae III 27 microns long. Abdomen entirely microtuberculate; tergites 45-50; sternites 70-75; the tergites slightly arched centrally just behind shield. Lateral seta ahead of genital seta, about 5 microns long, on ring 11; first ventral 23 microns long, on sternite 26; second ventral 20 microns long, on sternite 47; third ventral about 24 microns long, about 6 rings from rear. Caudal seta about 40 microns long; accessary seta present. Female genitalia 20 microns wide, 13.5 microns long, coverflap with 10-12 ridges, seta 9 microns long.

Male 125–130 microns long, 40 microns wide, 35 microns thick; male genitalia 17.5 microns wide, 11 microns long, seta 11 microns long.

Type slide, so designated, of mites collected as vagrants on the undersides of blackberry leaves (*Rubus vitifolius* C&S) near Clarksburg, Yolo County, California, July 3, 1938, by the writer. Three paratype slides bear the same data. No *Phyllocoptes* has been listed from blackberry. This mite is characterized by the granular shield, short upward-directed dorsal setae, and entirely microtuberculate body.

Phyllocoptes cornutus Banks

Plate XXVIII

Banks, Proc. Ent. Soc. Wash., Vol. 7, p. 141, 1905.
Essig, Ins. Wn. N. Am., p. 49, 1926.

Female 190–200 microns long, 55 microns wide, 52 microns thick. Body curved spindleform, reddish amber color. Rostrum projecting down; Shield 42 microns long, 50 microns wide, subtriangular, anteriorly produced into a moderately acute lobe over the rostrum; design of indistinct longitudinal lines and a transverse sinuate ridge anteriorly; dorsal tubercles 34 microns apart. Dorsal setae 12 microns long, projecting backward. Forelegs 32 microns long, patella 5 microns long, patellar seta 18 microns long, tibia 7.5 microns long, tarsus 7 microns long, claw 6.5 microns long, knobbed, featherclaw 4-rayed. Hindlegs 28 microns long, patella 4.5 microns long, patellar seta 6.5 microns long, tibia 6.5 microns long, tarsus 6.75 microns long, claw 6.75 microns long. Coxae touching; setae I slightly further apart than setae II. Coxal setae III 34 microns long; abdomen practically smooth or slightly micro-

tuberculate above, the tergites slightly arched centrally anteriorly; tergites 28–30, sternites 50–53. Lateral seta a little ahead of genital seta, 13 microns long, on ring 7. First ventral 47 microns long, on ring 16; second ventral 15 microns long, on ring 33; third ventral 20 microns long, on ring 4 from rear. Caudal seta about 48 microns long, accessory seta present. Female genitalia 22.5 microns wide, 14 microns long, coverflap with 18–20 ridges, seta 15 microns long.

Male 130 microns long, 50 microns wide, 40 microns thick; male genitalia 18 microns wide, 13.5 microns long, seta 12 microns long.

Specimens are on hand from peach leaves in the Madera district, kindly collected during June and sent me by Niels Overgaard, Agricultural Commissioner. Mrs. Iris Savage has brought me specimens from Sacramento nectarine. Specimens are on hand also from Davis, California, peach leaves, June 24, and July 9, 1938. The Davis locality was shown me by Dr. S. F. Bailey. It has, however, been difficult to get satisfactory material. This characterization of what is termed *cornutus* Banks, should not be considered as final since the type locality for the original naming is Washington, D. C. We know from the original article that the shield is acuminate anteriorly, that the color is reddish, and that the mite lives on either surface of peach leaves. These check with our California forms. On the other hand Banks gives the tergites as 32 in number whereas our specimens do not quite attain that figure.

Phyllocoptes rhamnicola Kiefer, new species

Plate XXIX

Female 145–155 microns long, 50 microns wide, 45 microns thick. Body rather thick spindleform, color yellow to amber. Rostrum projecting down; shield 48 microns long, 44 microns wide; subtriangular, the anterior projection over the rostrum rather broad and blunt; design of indistinct curved lines; sides with granular band; dorsal tubercles 28 microns apart, dorsal setae 24 microns long, projecting backward. Legs moderately stout; forelegs 33.5 microns long, patella 5 microns long, patellar seta 20 microns long, tibia 9 microns long, tarsus 7 microns long, claw 7 microns long, knobbed; featherclaw 4-rayed. Hindlegs 31 microns long, patella 4.5 microns long, patellar seta 4.5 microns long; tibia 7 microns long; tarsus 6.5 microns long; claw 7 microns long. Coxae contiguous; setae I farther apart than setae II; coxal setae III 27 microns long. Abdomen broadly arched centrally longitudinally, no microtubercles on tergites; tergites 27–31; sternites 67–71. Lateral seta a little ahead of genital seta, 15 microns long, on ring 8; first ventral 28 microns long on ring 23; second ventral 16 microns long, on ring 42; third ventral 13 microns long, on ring 6–7 from rear; Caudal seta about 40 microns long; accessory seta present. Female genitalia 18 microns wide, 14 microns long; coverflap with 10–11 ridges; seta 9 microns long.

Male 140–150 microns long, 45 microns wide, 40 microns thick.

Male genitalia 18 microns wide, 11 microns long, seta 11 microns long.

Type slide so designated, of mites collected by the writer from the underside of Coffee Berry leaves (*Rhamnus californicus* Esch.,) at Camp Rodgers, Plumas County, California, June 12, 1938. Four paratype slides bear same data. The mites when collected were principally vagrants but seem to be associated with leaf wrinkling between lateral veins, causing an approximation of the veins. This variety of *Rhamnus californicus* is smooth-leaved. Of particular note is the broad ridge down the center of the back of this mite.

Phyllocoptes aesculifoliae Keifer, new species

Plate XXX

Female 170 microns long, 60 microns wide, 50 microns thick. Body spindleform, amber color; rostrum projecting down; shield 46 microns long, 55 microns wide; subtriangular, the design almost obsolete and the front point slightly knobbed; overhanging the rostrum. Dorsal tubercles 22 microns apart; dorsal setae 13 microns long, projecting backward. Legs moderately long. Forelegs 33 microns long, patella 5.5 microns long, patellar seta 25 microns long, tibia 6.5 microns long, tarsus 7.5 microns long, claw 7 microns long, knobbed, featherclaw 4-rayed. Hindlegs 31 microns long, patella 5 microns long, patellar seta 12 microns long, tibia 5.5 microns long, tarsus 7 microns long, claw 7 microns long. Coxae contiguous; setae I a little farther apart than setae II. Coxal setae III 35 microns long. Abdomen with smooth tergites and sternites, the tergites laterally usually with sinuations and folds; tergites 20-24; sternites 53-57. Lateral seta slightly ahead

of genital seta, 22 microns long, on ring 7. First ventral 36 microns long, on ring 21; second ventral 13 microns long, on ring 37; third ventral 22 microns long, on ring 4 from rear. Caudal seta about 56 microns long; accessory seta absent. Female genitalia 22 microns wide, 14 microns long, coverflap with about 10 ridges, seta 13 microns long.

Male unknown.

Type slide, so designated, of mites collected near Novata, Marin County, California, June 25, 1938, from both surfaces of the leaves of *Aesculus californicus* (Spach) Nutt. the California Buckeye. Three paratype slides bear same data. The mites, in company with the seventeenth species herein described cause slight silvering of the leaves. Of particular note in this case, are the smooth sternites and the often folded and irregular condition of the lateral tergites. This latter feature is not always present however. No *Phyllocoptes* is listed from *Aesculus*.

Genus **Epitrimerus** Nal. 1898

Nalepa, Das Tierreich, p. 16, 1898.

The first species in the following list in Das Tierreich is *gemmicola* Nal., and this can be considered as the genotype. The name *Trimerus* Nal. 1892 was first used for these forms but is preoccupied. The chief distinguishing characters of this genus are the flattened body, a shallow furrow on each side of the dorsum, the tergites narrow, but smooth or microtuberculate. These characters are coupled with the Phyllocoptine feature of fewer tergites than sternites.

Epitrimerus pteleae Keifer, new species

Plate XXXI

Female 145–150 microns long, 53 microns wide, 48–50 microns thick. Body spindleform, not much flattened, yellow in color. Rostrum projecting down. Shield 45 microns long, 47 microns wide, subtriangular, acuminate over rostrum base; design of indistinct longitudinal lines, rows and bands of granulations laterally; dorsal tubercles 20 microns apart, dorsal setae 17 microns long, projecting centrocaudad. Legs moderately long. Forelegs 31 microns long, patella 4.5 microns long, patellar seta 23 microns long, tibia 6.5 microns long, tarsus 6.75 microns long, claw 7.5 microns long, knobbed; featherclaw 6-rayed. Hindlegs 26.5 microns long, patella 4.5 microns long, patellar seta 6.5 microns long, tibia 5 microns long, tarsus 6.5 microns long, claw 9 microns long. Coxae with setae I placed well ahead of the sternal line and wider than setae II; coxal seta III 25 microns long. Abdomen sparsely microtuberculate above especially in the furrow, a little heavier perhaps middorsally; sternites entirely microtuberculate; tergites 50–55; sternites 65–70. Lateral seta ahead of genital seta, 14 microns long, on ring 11. First ventral 25 microns long, on ring 25; second ventral 18 microns long, on ring 44; third ventral 18 microns long, on ring 5 from rear; caudal seta 42–44 microns long, accessary seta present.

Female genitalia 22 microns wide, 13.5 microns long, coverflap with about 12 ridges, seta 11.5 microns long.

Male 140–150 microns long, 44 microns wide, 40–45 microns thick. Male genitalia 20 microns wide, 13.5 microns long, seta 16–18 microns long.

Type slide, so designated, of mites collected by the writer browning the undersides of leaves of *Ptelea baldwinii crenulata* Jepson at Rodeo, California, June 29, 1938. Four paratype slides so designated with same data. The mites occur on the fruit as well as the leaves. The species is characterized by the shield design and featherclaw. No mite is listed from *Ptelea*, which belongs to the Rutaceae.

Epitrimerus califraxini Keifer, new species

Plate XXXII

Female 170–190 microns long, 60–65 microns wide, 50–60 microns thick. Body spindleform, rather longitudinally arched middorsally, color light yellow to amber. Rostrum projecting down. Shield 46.5 microns long, 53 microns wide; subtriangular, acuminate anteriorly; design of curved lines, forming a network; smooth sides; dorsal tubercles 42.5 microns apart, dorsal setae 17 microns long, projecting backward. Legs moderately long. Forelegs 35 microns long, patella 6.5 microns long, patellar seta 21.5 microns long, tibia 8.5 microns long, tarsus 8 microns long, claw

6.75 microns long, knobbed; featherclaw 4-rayed. Hindlegs 33.5 microns long, patella 6 microns long, patellar seta 13 microns long, tibia 7 microns long, tarsus 7.5 microns long, claw 7.5 microns long. Fore coxae contiguous; setae I slightly farther apart than setae II; coxal setae III 37 microns long. Abdomen above usually microtuberculate, but often smooth; tergites 34-38; sternites 65–70. Lateral seta ahead of genital seta, 17 microns long, on ring 7. First ventral 28 microns long, on ring 20; second ventral 14 microns long on ring 44; third ventral 25 microns long, on ring 5 from rear; caudal seta about 80 microns long; accessary seta present. Female genitalia 23 microns wide, 16 microns long, coverflap with 10 longitudinal ridges, seta 12 microns long.

Male 160–170 microns long, 55–60 microns wide, 45–50 microns thick. Male genitalia 23 microns wide, 16 microns long, seta 17 microns long.

Type slide, so designated, of mites collected on the undersides of ash leaves (*Fraxinus* sp. possibly *dipetala* H&A) May 30, 1938, by the writer along Webber Creek at Missouri Flat near Placerville, California. Four paratype slides, so designated, also bear these data. Two paratype slides of mites taken here on July 7, 1938. The mites seem to be associated with some leaf deformation and stunting. The shield design is likely the most distinctive feature.

Epitrimerus pirifoliae Keifer, new species

Plate XXXIII

Female up to 160 microns long, 70 microns wide across shield, 45-50 microns thick, body wedge-shaped flattened, color yellow to amber. Rostrum short, projecting ventrad. Shield broad-triangular, 53 microns long, 67 microns wide, general surface irrorated with granules, pattern obscure, with a central longitudinal ridge flanked by faint ridges from dorsal tubercles; shield on each side with a very prominent serrate lobe; dorsal tubercles moderately large, 11 microns ahead of the rear margin and 20 microns apart; setae directed dorsocentrad, 10–12 microns long. Legs moderately slender. Foreleg 33.5 microns long, patella 6 microns long, patellar seta 20 microns long, tibia 8.5 microns long, tarsus 6.5 microns long, claw 6.5 microns long, featherclaw 4-rayed. Hindleg 32 microns long, patella 5.5 microns long, tibia 6.5 microns long, tarsus 7 microns long, claw 7 microns long. Anterior coxae approximate; setae I farther apart than setae II, setae II opposite distal end of sternum and just ahead of a line through setae III, setae III about 45–50 microns long. Abdomen entirely microtuberculate with 45–50 tergites and 70–75 sternites. Lateral seta a little ahead of the genital seta, 35 microns long, on about ring 10–12; first ventral 29 microns long on about ring 24–26; second ventral 35 microns long, on ring 47-50; third ventral about 30 microns long, on 5–6 rings from rear. Caudal seta about 56 microns long, accessory setae present. Female genitalia 24 microns wide, 15 microns long, coverflap with about 12 ridges, genital seta 20 microns long.

Male 140 microns long, 60 microns wide, 40 microns thick. Male genitalia 21 microns wide, 14 microns long, the seta 23 microns long.

Type slide, so designated, of mites taken from the undersides of pear leaves (*Pyrus communis* L.) in Sacramento, June 2, 1938, by the writer. Four paratype slides bear the same data. The mites cause severe browning of the pear leaves when numerous. The mite in question has been going under the name of *Epitrimerus piri* (Nal.), (Anz. Ak. Wien, Vol. 28, p. 162, 1891). Nalepa's description in the Zoologica, Vol. 24, p. 276, 1911, is among his earlier works and not sufficiently detailed to distinguish the new mite from *piri,* although it seems hardly possible that he would have described the shield as he did if he had been dealing with the same mite as is here on hand. However, when we turn to the figure of *Epitrimerus piri* in the above volume of Zoologica, plate VI, fig. 14a, 14b, there immediately appears a striking difference between *piri* as known in Middle Europe and what has been taken in California. It is the writer's experience that Nalepa's drawings of shield designs have been quite accurate and the only way we can assume the mite here named *pirifoliae* to be the same as *piri* is to assume Nalepa's figure incorrect. This seems quite unlikely. The new species then differs from *piri* in possessing a granular shield with a very indistinct design and with very prominent serrate lateral lobes. The explanation of the occurrence of this mite in California must be

either that there is a northern and a southern pear rust mite in Europe, or the new species may have been imported on oriental stock. Mites are also on hand from Lakeport and Davis.

Calepitrimerus Keifer, new genus

Rostrum short, directed ventrad. Shield produced anteriorly over rostrum base; dorsal setae present. Legs six-jointed, featherclaw simple; all setae present. Abdomen with all setae present, no accessory setae, somewhat flattened dorsoventrally, and elongate wedge-shaped in dorsal view; abdominal sternites not much more numerous than tergites; the principal part of the abdominal dorsum longitudinally concave, flanked laterally by a ridge on each side which begins somewhat behind the shield, ending shortly before the anal lobes; middorsal anterior half or two-thirds of abdomen, consisting of a large sharp carina, ending abruptly to the rear.

Genotype as follows:

Calepitrimerus cariniferus, Keifer, new species
Plate XXXIV

Female 170–180 microns long, 50–60 microns wide, 45–55 microns thick. Body wedge-shaped, light yellow. Rostrum projecting down. Shield 48 microns long, 45 microns wide, subtriangular, overhanging the rostrum anteriorly; design indistinct, almost obsolete, sparse granules; dorsal tubercles 20 microns apart, dorsal setae 12 microns long, projecting upwards. Legs moderately slender. Forelegs 33.5 microns long, patella 7.5 microns long, patellar seta 25 microns long, tibia 8 microns long, tarsus 7.5 microns long, claw 7 microns long, knobbed; featherclaw 4-rayed. Hindlegs 29 microns long, patella 7.5 microns long, patellar seta 9 microns long, tibia 6.5 microns long, tarsus 7.5 microns long, claw 7 microns long. Anterior coxae contiguous; setae I not much farther apart than setae II; coxal setae III 38 microns long. Abdomen with tergites much less prominently microtuberculate than sternites; central longitudinal carina or ridge 31–32 tergites long; lateral ridge beginning on tergite 7 or 8; tergites 45-49; sternites 70-74. Lateral seta a little ahead of genital seta, 24 microns long, on ring or sternite 6–8; first ventral 46 microns long, on ring 21–23; second ventral 32 microns long on ring 43–45; third ventral 23 microns long, on ring 5 from rear; caudal seta 70 microns long; accessory seta present. Female genitalia 18–20 microns wide, 15–17 microns long, coverflap with 8–10 ridges; seta 22 microns long.

Male 160 microns long, 50 microns wide, 48 microns thick. Male genitalia 17 microns wide, 11 microns long, seta 11 microns long.

Type slide, so designated, of mites collected June 20, 1938, on undersides of leaves of *Artemisia heterophylla* Nutt., wormwood, at Sacramento. One paratype slide bears these data. The mites occur with *Eriophyes neoartemisiae* and *Paraphytoptus inaequalis,* and it has been impossible to completely separate these on the slides. The affinities of this genus to *Epitrimeris* are at once apparent, but the confluence of the lateral grooves behind the central ridge is the new feature. (The plants from which this interesting species was taken had been growing unmolested for a number of years and carried a heavy infestation of numerous Arthropod species. Since the above collection these plants have been burned. An attempt to recover *carinifera* elsewhere has been unsuccessful.)

Calepitrimerus baileyi Keifer, new species
Plate XXXV

Female 130–140 microns long, 45 microns wide, 40 microns thick, color yellow to amber or pinkish-amber; form flattened wedge-shaped, widest across the shield. Shield broad-triangular; dorsal tubercles 4 microns ahead of the rear margin, 16 microns apart; shield design very obscure, surface slightly granular, a slight central ridge; shield side lobed and somewhat serrate; dorsal setae directed dorsocentrad and a little anteriorly; the seta 9 microns long. Legs moderately slender. Forelegs 29 microns long, patella 4.5 microns long, patellar seta 12 microns long, tibia 7 microns long, tarsus 6.75 microns long, claw knobbed, 6.5 microns long, featherclaw 4-rayed. Hindleg 26.5 microns long, patella 4.5 microns long, patellar seta about 3–4 microns long, tibia 4.5 microns long, tarsus 6 microns long, claw 6.5 microns long. Anterior coxae contiguous the sternal line short; setae I ahead of anterior end of sternal line and wider apart than setae II; setae II opposite rear end of sternal line; setae III 23 microns long. Abdomen with 65–70 tergites, the microtubercles obscure except on the central carina; the carina runs to the 35 tergite. Sternites but little more numerous than tergites and strongly microtuberculate. Lateral seta 14 microns long, on sternite 9; first ventral 21 microns long, on sternite 23; second ventral 12 microns long, on ring 42; third ventral 17 microns long, 6 rings from rear. Caudal seta 47 microns long; accessory seta short. Female

genitalia 19 microns wide, 13 microns long, the coverflap with 10 to 12 longitudinal ridges, seta 13 microns long.

Male 125 microns long, 40 microns wide, 40 microns thick. Male genitalia 17.5 microns wide, 11 microns long, seta 6.5 microns long.

Type slide, so designated, of mites collected, June 24, 1938, at Davis, California, from the undersides of apple leaves by Dr. S. F. Bailey and the writer. Four paratype slides bear these data and one has the same data but collected on July 9 by the writer. I am indebted to Dr. Bailey for showing me this infestation. The mites cause a light browning of the undersides of the leaves. The apple leaves from which these were taken are quite pilose and make an excellent habitat for surface mites. This species differs from *carinifera* principally in that the middorsal carina is only about half the abdominal length, whereas in the former described species this is over two-thirds the abdominal length. *Calepitrimerus baileyi* is further of note in having the sternites and tergites very nearly equal in number.

It was originally thought that these mites were *Phyllocoptes schlectendali* Nal., the apple rust mite. That mite may be present in this locality since there is a sparse population of an unstudied *Phyllocoptes* on these leaves. Whatever it is the damage observed this season is almost entirely due to the new species.

Dr. Bailey states that he discovered these mites while studying the life history of *Leptothrips mali* which feeds on them. Of some apparent importance, also, in the natural control of these rust mites is a species of the omnipresent Parasitid type of mite. But the efficiency of these nervous Parasitid mites is open to question. They may prefer eggs rather than adult Eriophyids since they so frequently pass over them.

Caliphytoptus Keifer, new genus

Rostrum short, projecting down. Shield overhanging rostrum base anteriorly. Legs as usual with all setae; featherclaw simple; coxae with all setae. Abdomen with setae as usual; sternites more than twice as numerous as tergites; tergites smooth and rather flattened anteriorly with a medium longitudinal ridge extending from behind the first to but not including the tenth tergite, tenth to thirteenth tergites forming a prominent transverse notch; remainder of abdomen bent ventrad and circular; sternites microtuberculate.

Genotype as follows:

Caliphytoptus quercilobatae Keifer, new species

Plate XXXVI

Female 125–130 microns long, 45 microns wide, 33 microns thick. Body flattened, spindleform from above, light yellow. Rostrum projecting down. Shield 32 microns long, 42 microns wide. Design a network of carinae; dorsal tubercles 19.5 microns apart, a little ahead of rear margin; dorsal setae 17 microns long, projecting up. Legs moderately stout. Forelegs 30 microns long, patella 5.5 microns long, patellar seta 19 microns long, tibia 6 microns long, tarsus 7 microns long, claw 8 microns long, knobbed; featherclaw 5 rayed. Hindlegs 27.5 microns long, patella 5 microns long, patellar seta 8 microns long, tibia 4.5 microns long, tarsus 6.5 microns long, claw 10.5 microns long, attenuate. Anterior coxae contiguous; setae I but little wider than setae II. Coxal setae III 40 microns long. Abdomen as described; tergites about 17; sternites 48–50. Lateral seta a little ahead of genital seta, 10 microns long, on sternite or ventral half-ring 6–7; first ventral 25 microns long, on ring 17–18; second ventral 11.5 microns long on ring 28–29; third ventral 18 microns long, on ring 5 from rear; caudal seta 65–75 microns long; accessory seta present. Female genitalia 20 microns wide, 9 microns long, coverflap with about 6 ridges, seta 22 microns long.

Male unknown.

Type slide, so designated, of mite collected May 31, 1938, at Ojai, Ventura County, California, as vagrants on the undersurface of *Quercus lobata* Neé, Valley White Oak, leaves, by Romain Young of the Ventura County Agricultural Commissioner's office. Four paratype slides are with these same data. The mites apparently caused no injury although

the tree in question was said to be ailing. They are found principally among the hairs along the midrib and are mixed on the slides with *"Phyllocoptes" megarostris. Caliphytoptus quercilobatae* has also been taken on White Oak leaves at Novato, California, June 25, 1938, by the writer. All specimens examined, comprising 50 or more, have the back structure exactly as illustrated, including the notch.

Genus **Oxypleurites** Nal. 1891.

Nalepa, Denk. Ak. Wien, Vol. 58, p. 868, 1891.

We can assign the species *heptacanthus* Nal. 1889 to the above named as the genotype. It is well illustrated in the Zoologica Vol. 24, p. 271, plate 6, 1911. The genus, referable to the Phyllocoptinae, is chiefly characterized by the lateral toothlike projections of the tergites. There seems to be no immediate reason why we should separate the following described individuals from the European name here assigned to them. The tergites are fewer in number than that given for the European individuals but that seems relatively unimportant in this case.

Oxypleurites carinatus (Nal.)

Plate XXXVII

Nalepa, Zool. Jahrb. Sust. Vol. 6, p. 329, 1892 (*Tegonotus*).
Nalepa, Das Tierreich, p. 67, 1898.

Female 170–190 microns long, 70 microns wide, 40–45 microns thick. Body flattened, wedge-shapped, yellow to amber. Rostrum projecting down. Shield 40 microns long, 70 microns wide, broadly substriangular, extended over rostrum base, arched centrally above, the design obscure; dorsal tubercules 22.5 microns apart, dorsal setae 12 microns long, projecting caudo-centrad. Legs moderately long. Forelegs 28.5 microns long, patella 5 microns long, patellar setae 22 microns long; tibia 6.5 microns long, tarsus 6.5 microns long, claw 6 microns long, knobbed; featherclaw 3–4-rayed. Hindlegs 28 microns long, patella 5 microns long, patellar seta 7 microns long, tibia 6.5 micron long, tarsus 6.5 microns long, claw 6.5 microns long. Anterior coxae contiguous; setae I a little wider apart than setae II; coxal setae III 23 microns long. Abdomen flattened, the tergites quite smooth and weakly toothed laterally; a prominent middorsal longitudinal carina runs for the first ten tergites; tergites 19; sternites 65–68. Lateral seta ahead of genital seta, 13 microns long, on ring 8. First ventral 22–23 microns long, on ring 24; second ventral 10 microns long on ring 42; third ventral 17 microns long, on ring 6 from rear; caudal seta 45–55 microns long, accessory seta absent. Female genitalia 23 microns wide, 15 microns long, coverflap with about 12 ridges, seta 8 microns long.

Male 150–170 microns long, 53 mirons wide, 35 microns thick. Male genitalia 15–16 microns wide, 13 microns long, seta 12 microns long.

The mites from which the above description was drawn were taken by the writer on California Buckeye leaves, *Aesculus californica* (Spach) Nutt., near Novato, Marin County, California, June 25, 1938. They were numerous on both surfaces of the leaves, and in company with *Phyllocoptes aesculifoliae,* were slightly silvering the leaves. These two species are mixed on the slides. Just what disposition will eventually be made of these individuals depends on further study. As stated above, it at present seems adequate to refer them to the horse chestnut species of Europe. As well as Novato, these mites were observed at Rodeo, and at Aukum, El Dorado County, (July 7). They were far more numerous however, at Novato.

Genus **Anthocoptes** Nal. 1892

Nalepa, Anz. Ak. Wien, Vol. 29, p. 16, 1892.

The species *loricatus* Nal., 1889, can be considered as the genotype. The principal character of this genus seems to be the distinct separation of the last few abdominal rings by reason of their suddenly more even dorso-ventral structure from the preceding tergites and sternites.

The tergites of the *Anthocoptes* species are usually strikingly large and cover many sternites each.

Anthocoptes ericameriella Keifer, new species

Plate XXXVIII

Female 160 microns long, 40 microns wide. Body spindleform, curved, light amber. Rostrum projecting obliquely down. Shield 33 microns long, 37.5 microns wide, smooth. Dorsal tubercles 22.5 microns apart, on rear edge; dorsal setae 17 microns long, stiff, projecting backwards. Legs moderately stout. Forelegs 24 microns long, patella 5.5–6 microns long, patellar seta 16 microns long, tibia 5.5–6 microns long, tarsus 6 microns long, claw 8.5 microns long, tapering and knobbed, featherclaw 5-rayed. Hindlegs 22 microns long, patella 5 microns long, patellar seta 7 microns long, tibia 4.5 microns long, tarsus 5.5 microns long, claw 8 microns long. Anterior coxae contiguous, the sternal line broadly forked; coxal setae III 28.5 microns long. Abdomen with tergites somewhat striated, rear edges irregular, laterally lobed; tergites 12–13; sternites 58–63. Lateral seta above genital seta, 12 microns long on ring or sternite 9–10. First ventral 34 microns long, on ring 21–23; second ventral 6.5 microns long on ring 33–35; third ventral 19 microns long on ring 6 from rear; caudal seta 38 microns long, accessory seta present. Female genitalia 21 microns wide, 12 microns long, coverflap with about 12 ridges; seta 12 microns long.

Male unknown.

Type slide, so designated, of mites collected by the writer from terminal Cecidomyid galls on *Ericameria ericoides* (Less.), May 23, 1938, in San Francisco. Four paratype slides bear these data. The mites are mixed with *Eriophyes spinulifera.* The striated tergites with irregular edges are likely the most distinctive feature in this case.

The generic key to the Phyllocoptinae given below incorporates the two new genera proposed in this article. Genera in bold-faced type are those with species in North America.

1. Number of tergites (dorsal half-rings) greater than the sternites (ventral half rings) sternites broad, scale-like, overlopping ..... *Phyllocoptyches* Nal.
1. Number of tergites less than the sternites; sternites narrow, usually microtuberculate 2
2. Featherclaw bifurcate ..... **Diptilomiopus** Nal.
2. Featherclaw undivided 3
3. Anterior part of abdomen with tergites and sternites similar; posterior part with sternites more numerous than tergites ..... **Paraphytoptus** Nal.
3. Abdomen almost entirely with dissimilar tergites and sternites; nearly all tergites broader than sternites 4
4. Tergites bearing rows of recumbent piglike chitinous processes ..... *Callyntrotus* Nal.
4. Tergites smooth or microtuberculate 5
5. Tergites projecting toothlike laterally ..... **Oxypleurites** Nal.
5. Tergites without lateral processes though overhanging the sternites in some cases 6
6. Abdomen with a subdorsal ridge on each side of a flat or concave middorsal longitudinal area 7
6. Abdomen evenly transversely convex, with two or more separate longitudinal shallow furrows, or more or less flattened above with a central longitudinal ridge or carina 8
7. With a median longitudinal ridge from the shield abruptly ending half or two-thirds the length of the abdomen ..... **Calepitrimerus** n. gen.
7. Dorsum between ridges entirely flat or concave ..... **Phyllocoptruta** Keifer
8. Dorsum flattened anteriorly with a medium longitudinal carina extending to the tenth tergite; tenth to fourteenth tergies forming a large transverse dorsal notch ..... **Caliphytophus** n. gen.
8. Dorsum of abdomen lacking a posterior dorsal notch 9
9. Dorsal side of abdomen evenly convex or feebly centrally broadly ridged 10
9. Dorsal side of abdomen with a strongly arched longitudinal central part 11
10. Caudal part of abdomen so ringed as to be distinct from another part ..... **Anthocoptes** Nal.
10. Caudal part of abdomen not clearly separated from preceding **Phyllocoptes** Nal.
11. Tergites narrow, more or less microtuberculate; a subdorsal furrow on each side fading caudally ..... **Epitrimerus** Nal.
11. Tergites broad, smooth, strongly arched, sometimes part project toothlike along middorsal arch ..... *Tegonotus* Nal.

Types of all new species are deposited in the Museum of the California Academy of Sciences, San Francisco.

Host List

1. Fagaceae
   - *Quercus agrifolia* Nee.
     - *Eriophyes mackiei* n. sp., erineum pockets on undersides of leaves.
   - *Quercus chrysolepis* Liebm.
     - *Eriophyes mackiei*
   - *Quercus lobata* Nee
     - *"Phyllocoptes megarostris* n. sp. leaf vagrant.
     - *Caliphytoptus quercilobatae* n. sp. leaf vagrant
2. Rosaceae
   - *Rubus vitifolius* C. & S.
     - *Phyllocoptes calirubi* n. sp., vagrant among hairs on leaf underside.
   - *Amygdalus persica* Cy
     - *Phyllocoptes cornutus* Banks, silvering both leaf surfaces.
   - *Pyrus communis* L.
     - *Epitrimerus pirifoliae* n. sp.*"rusting' of leaf undersurface.
   - *Pyrus malus* Cy.
     - *Calepitrimerus baileyi* n. sp. "rusting" of leaf undersurface.
3. Rutaceae
   - *Ptelea baldwinii crenulata* Jepson.
     - *Epitrimerus pteleae n. sp.* browning of leaf undersurface.
4. Sapindaceae
   - *Aesculus californicus* (Spach.)
     - *Phyllocoptes aesculifoliae* n. sp., silvering of leaf surfaces.
     - *Oxypleurites carinatus* Nal., silvering, of leaf surfaces.
5. Rhamnaceae
   - *Rhamnus californicus* Esch
     - *Phyllocoptes rhamnicola* n. sp. causing leaf deformation, also vagrant on leaf underside.
6. Ericaceae
   - *Arctostphylos* sp.
     - *Diptilomiopus arctostaphyli* n. sp., vagrant on second year leaves.
7. Oleaceae
   - *Fraxinus* sp. (dipetala H. & A.?)
     - *Epitrimerus califraxini* n. sp. deformation of leaves.
8. Compositae
   - *Ericameria ericoides* (Less.)
     - *Eriophyes spinulifera* Keifer, in terminal Cecidomyid galls.
     - *Anthocoptes ericameriella* n. sp., in terminal Cecidomyid galls.
   - *Artemisia heterophylla* Nutt.
     - *Eriophyes neoartemisiae* n. sp. left vagrant, in buds, possibly in erinea.
     - *Paraphytoptus inaequalis* n. sp., leaf vagrant.
     - *Calepitrimerus cariniferus* n. sp. leaf vagrant.

Designations on Plates**

AP	Anterior apodeme of the female genitalia
C	Anterior coxae
D	Dorsal view of mite
DA	Dorsal view of anterior section
DS	Dorsal view of shield and adjacent tergites
ED	Detail of dorsal skin (in this case from the side)
ES	Detail of side skin
F	Featherclaw
GF	Female genitalia
GF1	Female genitalia and coxal region
GM	Male genitalia
GMI	Male genitalia and coxal region.
L	Left legs
LA	Left foreleg
LT	Tarsus and associated structures
S	Side view of mite
SA	Side view of anterior section of mite
V	Ventral view of mite

* This mite has also been taken on *Heteromeles arbutifolia,* Toyon, in Sacramento.

** The foretibial seta has been erroneously omitted from some of the drawings. All species so far studied have this seta.

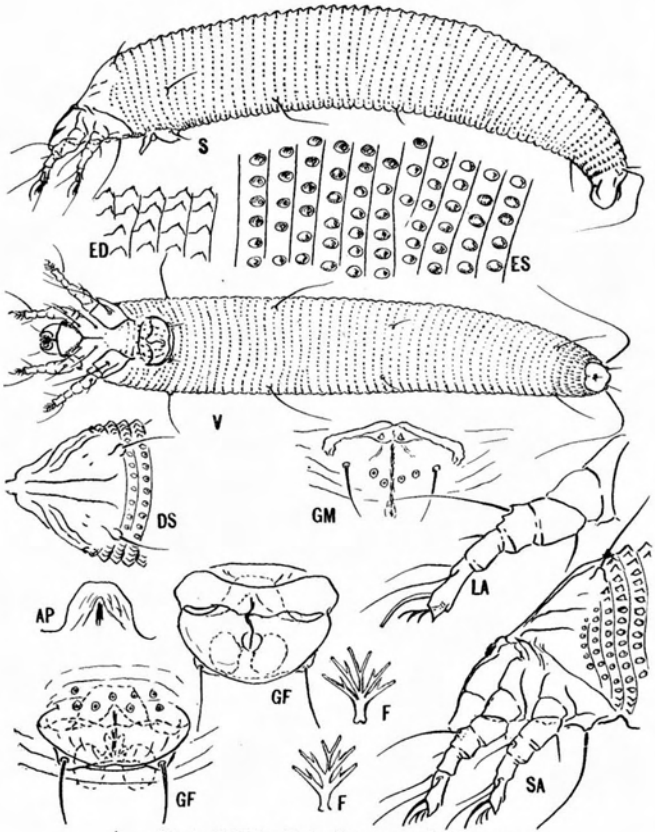

Plate XXI—*Eriophyes mackiei* n. sp.

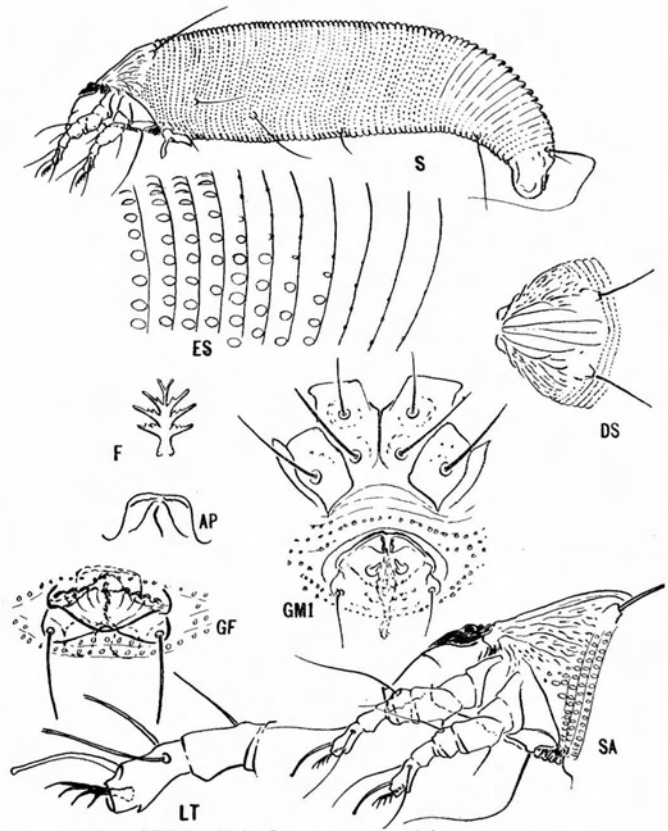

Plate XXII—*Eriophyes neoartemisiae* n. sp.

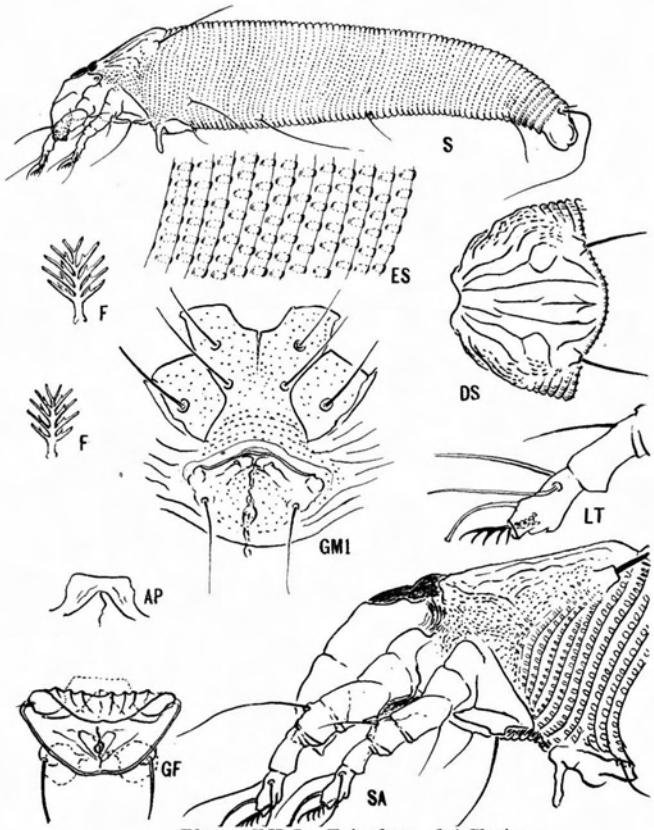

Plate XXIII—*Eriophyes fici* Essig.

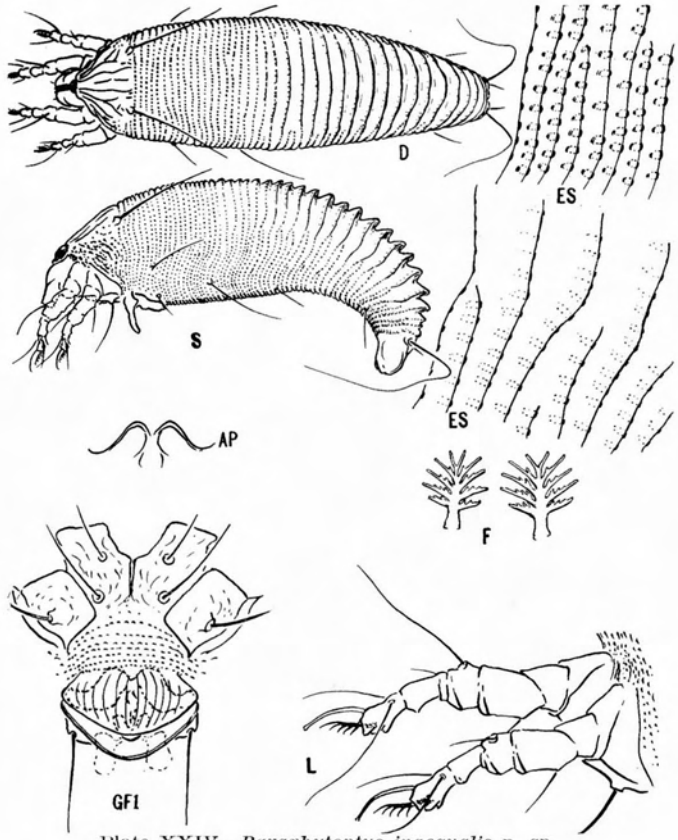

Plate XXIV—*Paraphytoptus inaequalis* n. sp.

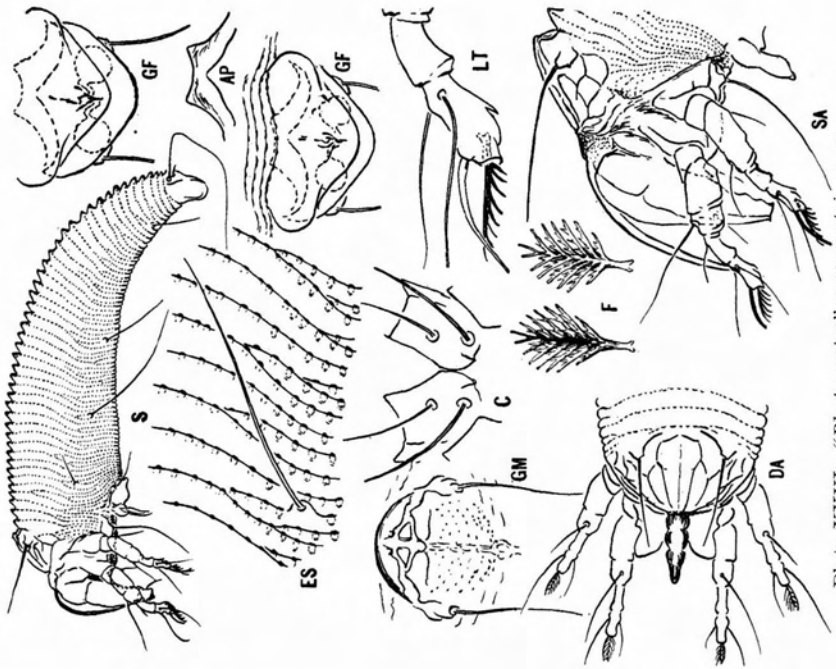

Plate XXVI—"*Phytocoptes*" *megarostris* n. sp.

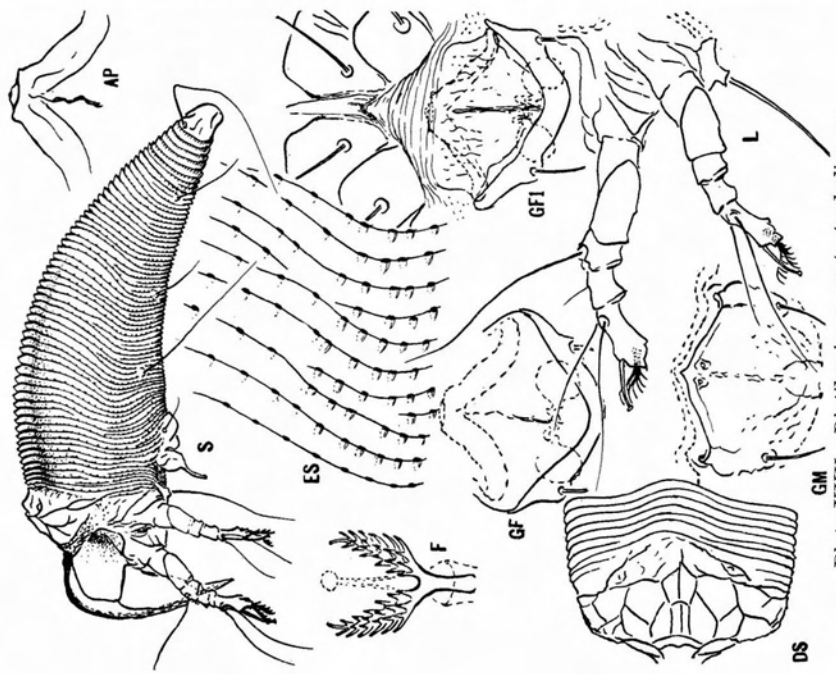

Plate XXV—*Diptilomiopus arctostaphyli* n. sp.

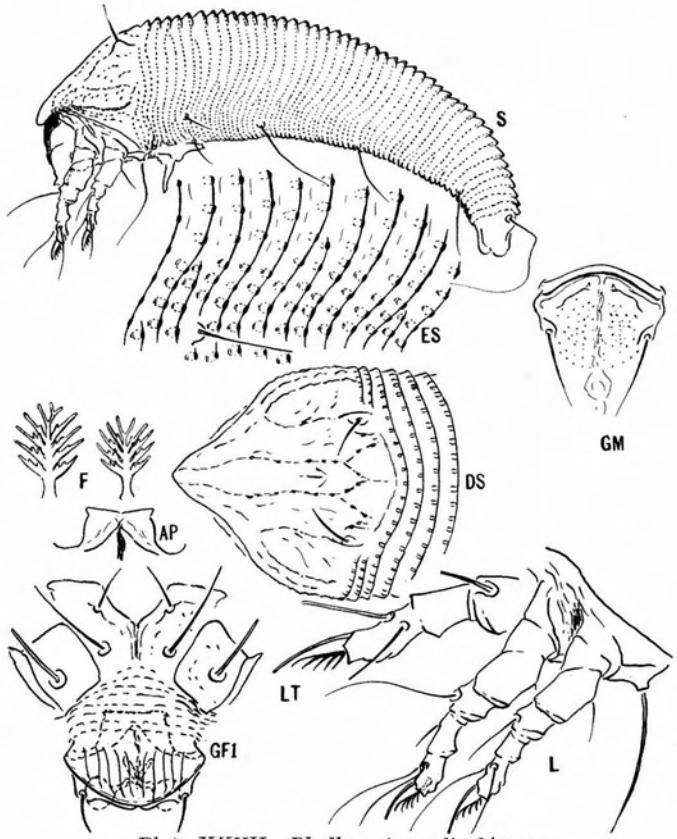

Plate XXVII—*Phyllocoptes calirubi* n. sp.

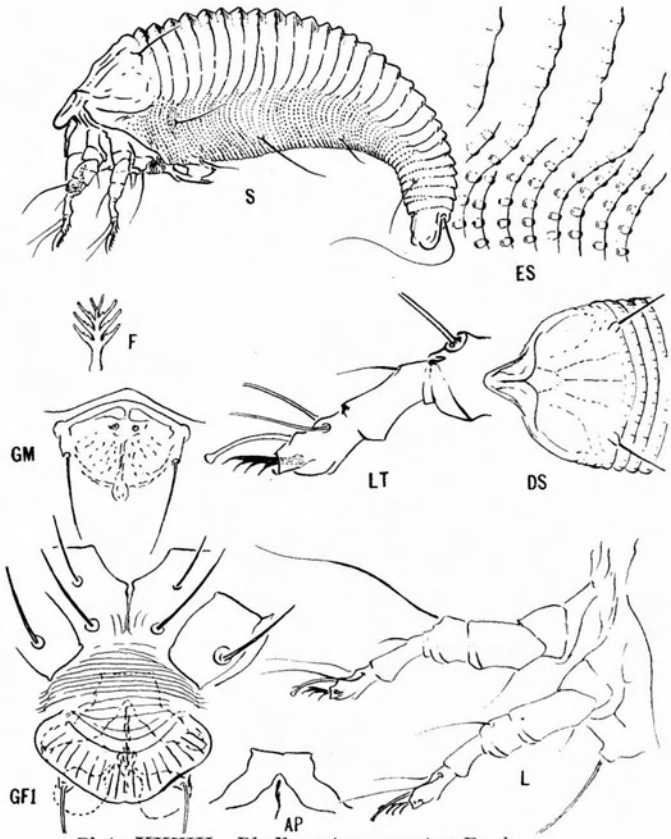

Plate XXVIII—*Phyllocoptes cornutus* Banks.

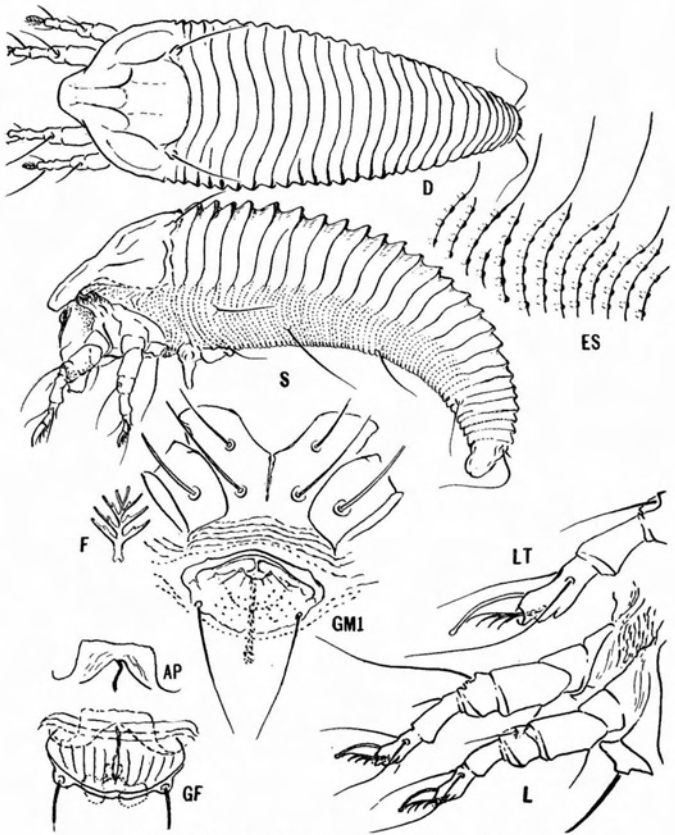

Plate XXIX—*Phyllocoptes rhamnicola* n. sp.

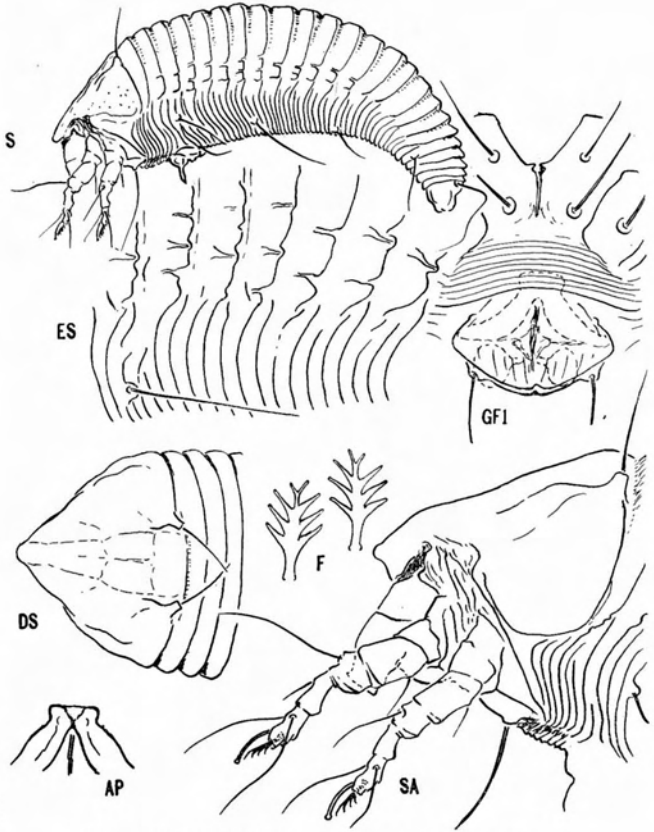

Plate XXX—*Phyllocoptes aesculifoliae* n. sp.

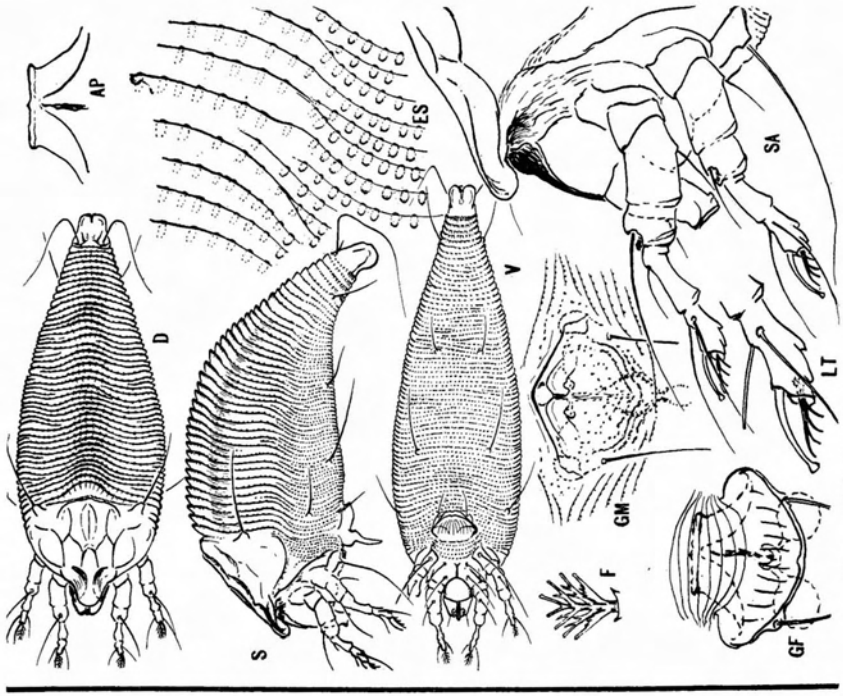

Plate XXXII—*Epitrimerus califraxini* n. sp.

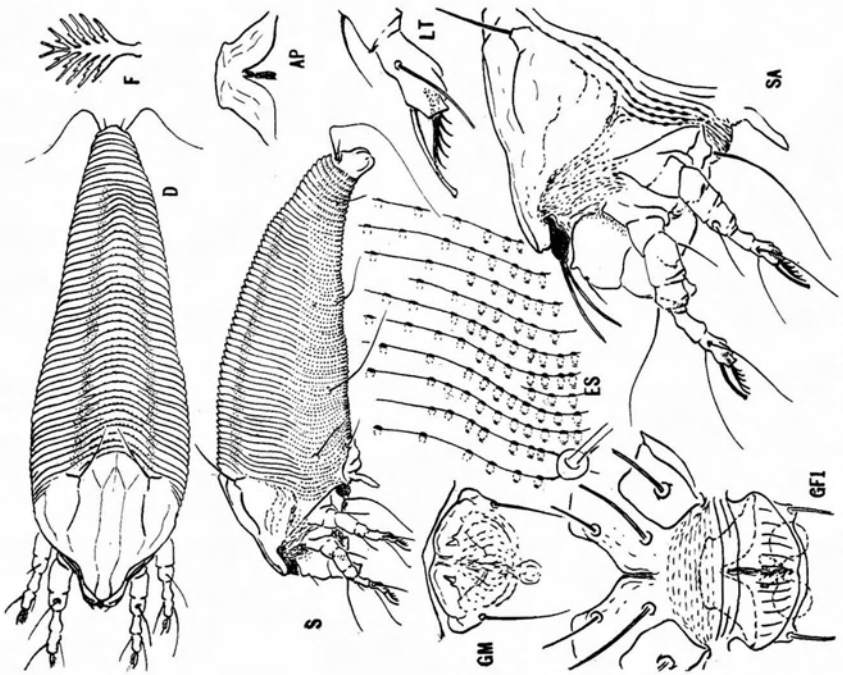

Plate XXXI—*Epitrimerus pteleae* n. sp.

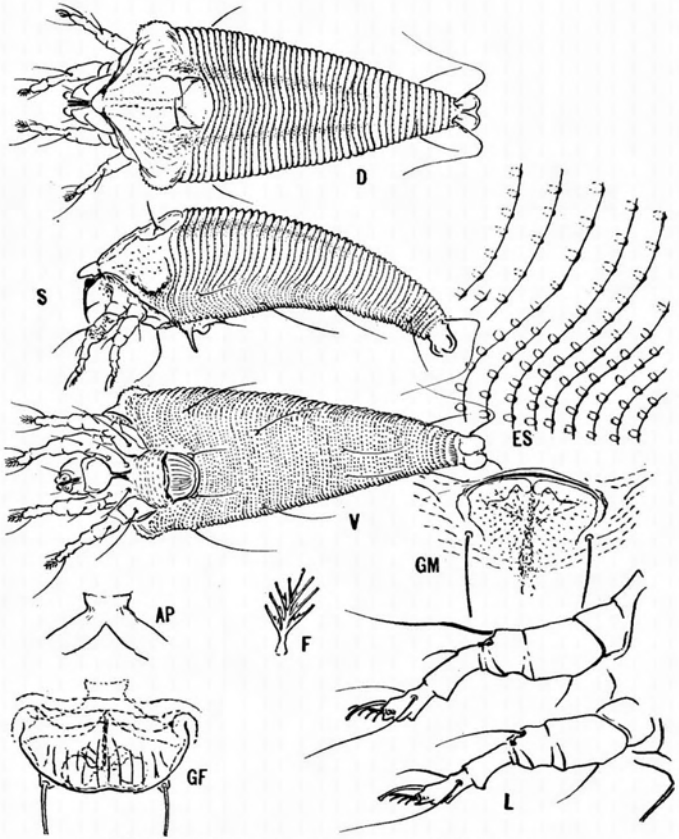

Plate XXXIII—*Epitrimerus pirifoliae* n. sp.

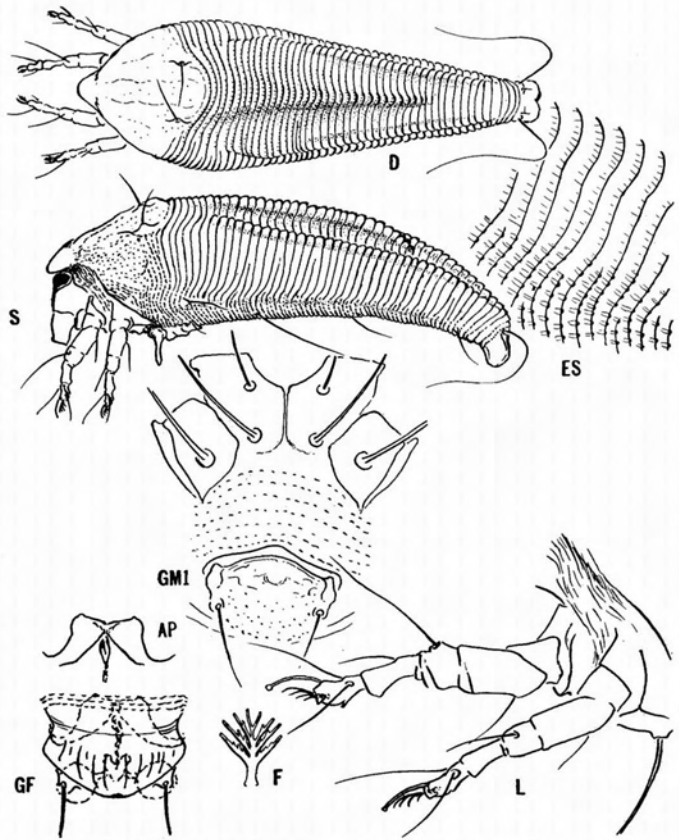

Plate XXXIV—*Calipitrimerus cariniferus* n. sp.

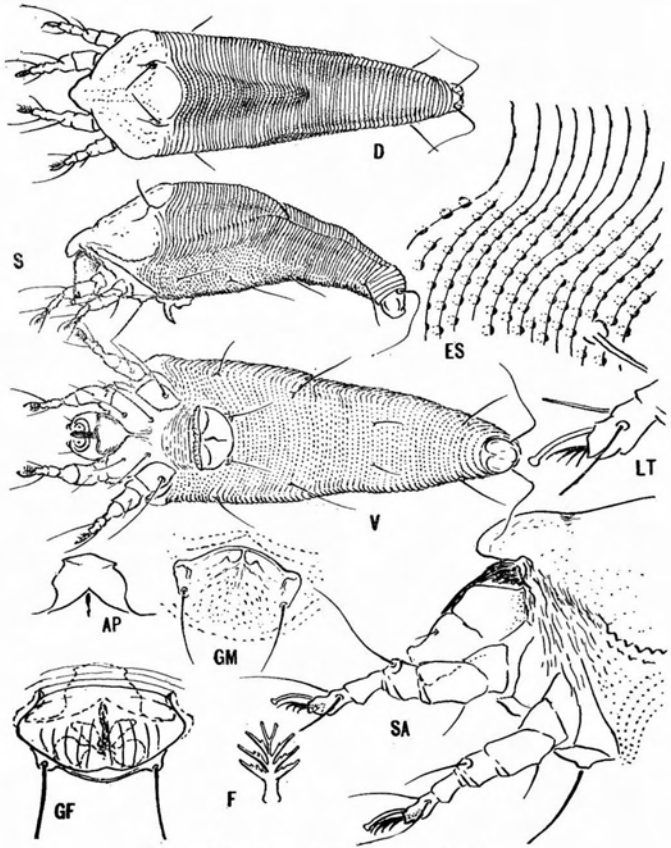

Plate XXXV—*Calipitrimerus baileyi* n. sp.

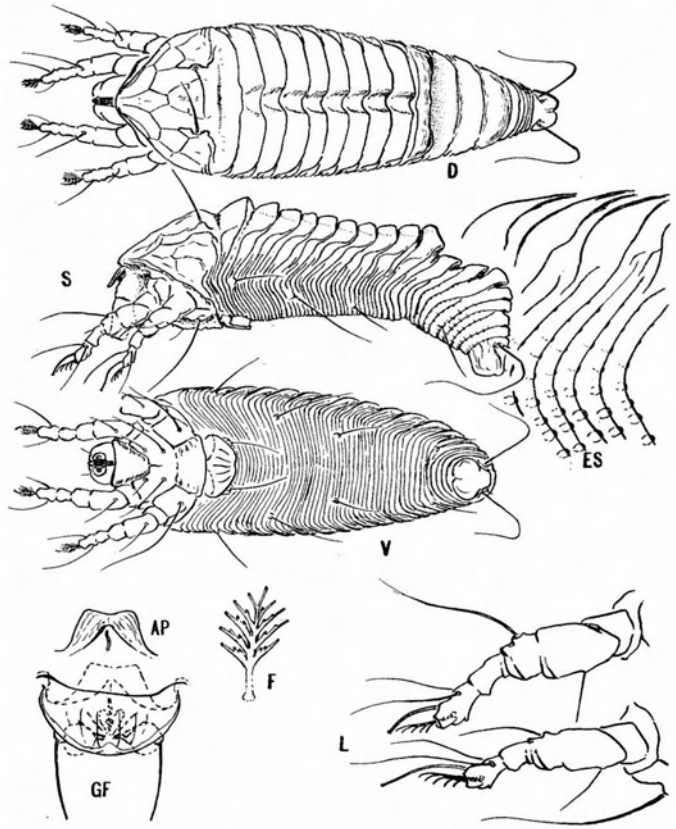

Plate XXXVI—*Caliphytoptus quercilobatae* n. sp.

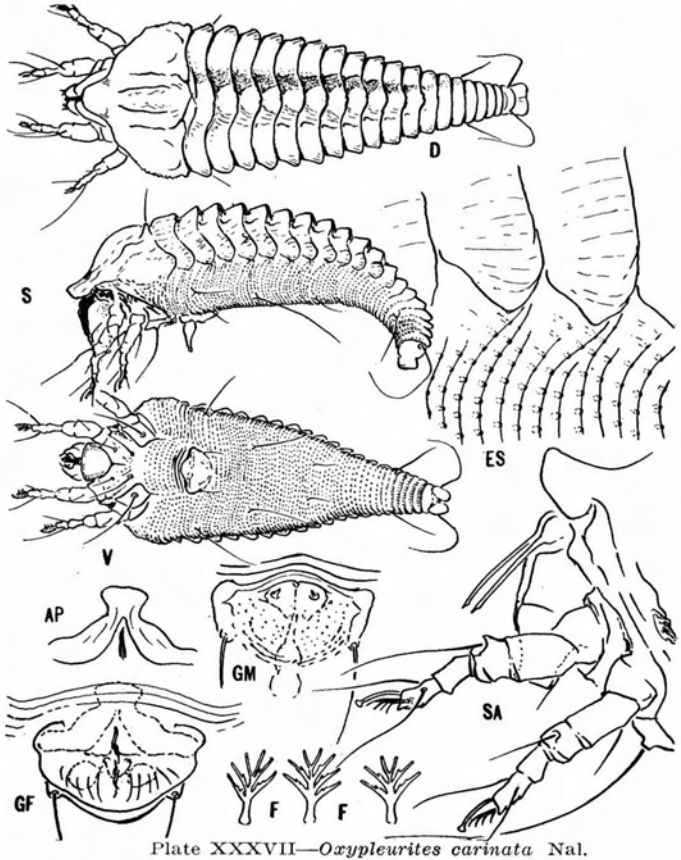

Plate XXXVII—*Oxypleurites carinata* Nal.

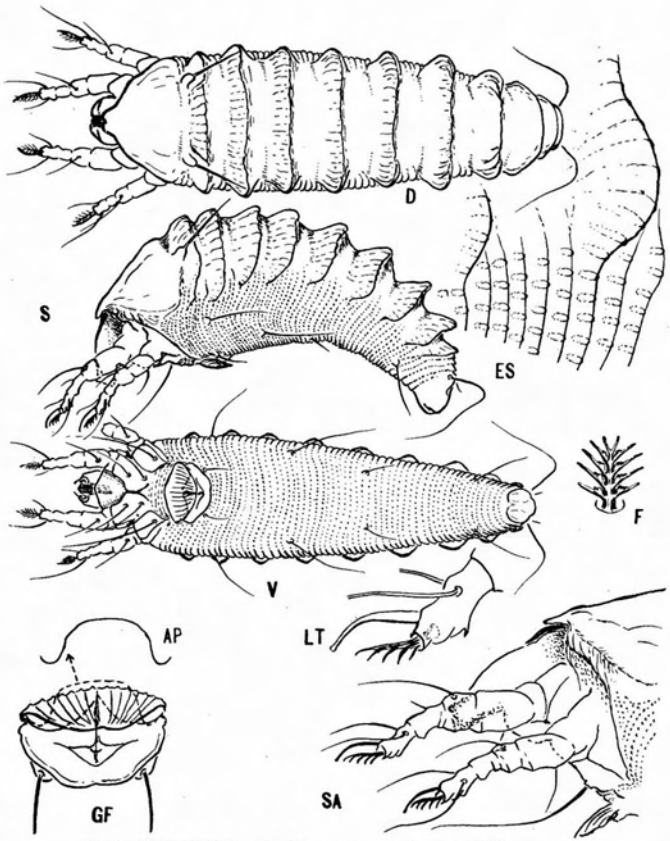

Plate XXXVIII—*Anthocoptes ericameriella* n. sp.